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The Teaching of Cancer Medicine By Educational Objectives

Richard F. Bakemeier, M.D., and W. P. Laird Myers, M.D.

Abstract—In this paper, the authors review the findings of a survey of cancer education activities in 110 U.S. medical schools conducted by the American Association for Cancer Education. Problems documented through this survey include the need for more coordination of multidisciplinary teaching; more exposure of students to patients with common malignancies, especially in an outpatient setting; and more uniform instruction in fundamental diagnostic procedures, such as proctosigmoidoscopy, bone marrow aspiration/biopsy, and indirect laryngoscopy. The present authors review these problems, particularly as they relate to educational functions of departments of medicine, and discuss an approach to the teaching of cancer medicine that employs the definition of educational objectives and relates these objectives to departmental teaching responsibilities. The authors suggest that the departments of medicine are in a unique position to stimulate and coordinate clinical cancer education by this approach.

During the past two decades, there have been widespread efforts in medical and dental schools to develop innovative, multidisciplinary cancer teaching programs, largely encouraged by grants from the National Cancer Institute's Clinical Cancer Education Program (recently renamed the Professional Oncology Education Program). Although these efforts have resulted in an increased interest in and awareness of cancer patients, certain problems pertaining to the teaching of cancer have become apparent, mainly as a result of a survey of cancer education activities in 110 U.S. medical schools (1). This Cancer Education Survey, completed in 1980 by the American Association for Cancer Education (AACE) and published by the National Institutes of Health, revealed that there continued to be a lack of coordination among medical school departments in the presentation of didactic material and a lack of facilitation of interdisciplinary teaching. Further, and perhaps of most importance, was the lack of well defined educational objectives in cancer education. This latter problem was addressed in a study jointly sponsored by the AACE and the National Cancer Institute, in which objectives were formulated for undergraduate education in oncology

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(2). These objectives are comprehensive and represent what students could learn if medical school departments pursued cancer teaching by defined objectives in a coordinated, interdisciplinary manner.

A worthy objective may be to teach about cancer in an interdisciplinary manner. But in the traditional departmental approach to medical education, who should take the lead? Departments of medicine have the most general, overall responsibility for teaching clinical medicine and usually teach and/or coordinate pathophysiology courses. Therefore, it seems logical that these departments should assume leadership in the coordinated teaching of oncology, if adequate faculty resources are available. The key words with respect to cancer education are "integrated," "coordinated," and "interdisciplinary." It is the purpose of the authors in this paper to suggest an approach to the teaching of cancer medicine which employs the concept of defined educational objectives within an interdisciplinary curricular effort. Departments of medicine could take the initiative in bringing about the necessary collaboration, working with an interdisciplinary cancer education committee. As background for the application of this approach to the teaching of oncology, the findings of the Cancer Education Survey are reviewed, with emphasis on the results pertaining to departments of medicine, and an example based on the results of the objective study is given.

Cancer Education Survey

In 1975 the National Cancer Institute (NCI) embarked on a survey of the status of cancer education in medical, osteopathic, and dental schools of the United States to assess the effect of its Clinical Cancer Education Program grants. These grants, begun in 1966, have provided funds to graduate schools for health professionals for the purpose of stimulating innovative, coordinated multidisciplinary cancer education programs.* The survey was designed to assess any unmet needs in the cancer education of medical, osteopathic, and dental students. Particular attention was paid to the teaching of principles of cancer diagnosis and management emerging from programs stimulated by the National Cancer Program undertaken in 1971 to develop resources which would effectively reduce the incidence, morbidity, and mortality of cancer in man. The American Association for Cancer Education was awarded a contract to conduct the survey. One of the present authors (RFB) served as the principal investigator, and the other served on the Editorial Advisory Committee of the project (1).

SURVEY DESIGN

The deans of all U.S. medical, dental, and osteopathic schools were contacted after consultations between the AACE Supervisory Committee for the Survey and the Association of American Medical Colleges, the American Association of Dental Colleges, the American Association of Colleges of Osteopathic Medicine, and an advisory committee consisting of deans of 15 professional schools. A total of 110 of 114 medical schools, 55 of 58 dental schools, and 8 of 9 colleges of osteopathic medicine agreed to participate. At each school, a faculty member was named by the dean to be the designated representative for the survey and to supervise completion of an institutional questionnaire.

Appropriate questionnaires were developed, tested, and distributed to acquire data on the following characteristics of

* Personal communication, Margaret H. Edwards, M.D., chief, Clinical Manpower Branch, National Cancer Institute, March 8, 1983.

professional schools relevant to student cancer education: administrative structure, physical facilities, faculty resources and attitudes, curriculum design, and student perceptions of the cancer curriculum and attitudes toward cancer patient care. The questionnaires were developed through discussions between the AACE committee and a consultant organization consisting of a group of academic political scientists experienced in survey design. Testing was done with sample groups of institutional representatives, faculty members, and students prior to final revisions and mailings of the questionnaires. Statistical analyses, including multiple-regression analyses, were applied to these data to clarify important determinants of effectiveness of cancer education. Institutional site visits were made to 44 schools to document further some of the information obtained from the questionnaire data. The schools were a nonrandom sample and varied in class size, location, age, and source of support (state-affiliated or private); the sample consisted of schools both with and without an NCI cancer center and an NCI clinical cancer education grant.

For faculty sampling, the designated representative provided a list of faculty members actively participating in the cancer education activities of any department within his institution. This resulted in a list of 2,450 cancer faculty members in 95 medical schools; the remaining 15 schools elected not to participate in this phase of the survey. The number of completed responses to the faculty and curriculum questionnaire from these faculty members totaled 1,311, for an overall response rate of 54 percent. These respondents included 201 members of basic science departments, 111 members of pathology departments, and 999 members of clinical departments, including 312 faculty members of departments of medicine. Information obtained through the questionnaire concerned existing research and teaching activities and those anticipated in the next five years, attitudes regarding the amount of cancer education in the curriculum, identification of deficiencies in the cancer-related component of the curriculum, and suggestions for reapportioning time and budgets devoted to cancer education.

Student sampling was performed by sending questionnaires to a random sample of 25 percent of the students just completing their preclinical courses and 25 percent of the students scheduled to graduate in approximately six months in each school. Completed responses were received from 1,861 preclinical students (60 percent of the sample) and from 1,757 clinical students (59 percent of the sample). The respondents were found to constitute a nationally representative sample of medical students by age, sex, state of residence, and career choices according to comparison with other surveys (3–5). In addition to demographic data, information obtained included the amount of exposure to various cancer education activities involving basic science topics, clinical topics, cancer patients by primary site, diagnostic and therapeutic procedures, use of therapeutic modalities, multidisciplinary treatment-planning conferences, and psychosocial aspects of cancer. Information was also collected about students' attitudes toward the amount and quality of cancer education activities, appropriate treatment of cancer patients, and the attractiveness of a variety of career choices, including oncologic specialties.

FACULTY RESPONSES

Among the 1,311 faculty members providing usable responses, 312 were re-

spondents from departments of medicine (or internal medicine) at 95 medical schools to the faculty and curriculum questionnaire (6). Only 75 of these (from 44 schools) met the criterion for classification as medical oncologists, that is, by reporting that at least 90 percent of their patients had cancer. Thus, only a quarter of the cancer education faculty members from departments of medicine were medical oncologists. The rest represented a broad variety of physicians, including hematologists, gastroenterologists, endocrinologists, immunologists, and infectious disease specialists. Thirty-eight percent of these respondents were in institutions associated with an NCI cancer center, and 59 percent were in institutions awarded an NCI clinical cancer education grant.

Forty-six percent of all faculty respondents from departments of medicine and 80 percent of the medical oncologists thought that cancer was given too little emphasis in their schools' curricula. Faculty members of other departments responded similarly, with the extremes represented by surgery (38 percent) and radiology (65 percent). Responses to questions about increasing curriculum hours for various cancer topics are listed in Table 1. Responses to other questions indicated that the most important cancer education problem areas reflected by faculty responses when asked for rank-ordering were the quality of teaching, early diagnosis and prevention, multidisciplinary management of cancer, psychosocial aspects of cancer, and the multidisciplinary presentation of tumor biology.

The survey indicated that medical oncology units of departments of medicine often served as centers of coordination for multidisciplinary student cancer education. Thirty-nine of the 44 schools visited had a cancer education coordinator, and 23 of these schools specified that medical oncologists were responsible for this interdepartmental coordination. Eleven schools indicated that surgeons served this function, and two had appointed radiation oncologists. This reflected a change from a decade ago when a majority of cancer education coordinators were academic surgeons or pathologists. Factors contributing to this shift of responsibility include (*a*) the increase in the number of academic medical oncologists; (*b*) the variety of research interests of medical oncologists, both basic science and clinical, which puts them in contact with faculty members of both basic science and clinical departments; and (*c*) the broad spectrum of cancer problems with which medical oncologists deal, including early diagnostic evaluation, multidisciplinary therapy, and palliation of advanced cancer.

TABLE 1

Percentage of 1,311 Responding Cancer Faculty Members by Department from 95 Medical Schools Indicating Desirability of Increased Curriculum Hours for Various Cancer Topics, 1978

Cancer Topics	Basic Science	Pathology	Medicine	Obstetrics/ Gynecology	Pediatrics	Radiology	Surgery
Basic science	54	47	34	42	36	28	29
Diagnosis	30	41	38	59	36	58	42
Multidisciplinary management	47	58	62	64	86	75	60
Psychosocial aspects	32	35	48	53	74	42	34
Chemotherapy	33	23	33	26	28	32	26
Radiation therapy	23	16	32	27	22	56	24
Surgical therapy	18	11	20	18	16	20	29

STUDENT RESPONSES

The responses to several of the questions in the student questionnaire are relevant to cancer education activities in clerkships, electives, and other curricular responsibilities of departments of medicine (7). Diagnostic procedures to which students are traditionally exposed during medicine clerkships include proctosigmoidoscopy, bone marrow aspiration and biopsy, and the physical examination. Of the 1,757 fourth-year students responding to the questionnaire, 47 percent stated they had not performed a proctosigmoidoscopy, and 54 percent stated they had not performed bone marrow aspiration or biopsy.

Fifty-eight percent of these clinical respondents stated they had less than 10 hours of cancer instruction during their medicine clerkships, as compared with 57 percent for surgery clerkships, 66 percent for obstetrics/gynecology clerkships, and 85 percent for pediatrics clerkships. The percentages of respondents having seen either no patients or six or more patients with specified cancers during all previous medical school experiences are listed in Table 2. The incidence of various types of cancer in the United States is also indicated. It is not to be inferred that the quality of cancer teaching can be assessed primarily from the number of patients seen. However, the figures indicate that a majority of students are being exposed to relatively few patients with common neoplasms. The representative responses in Table 2 indicate that approximately one-quarter of medical students may not have an opportunity to see patients with such relatively common cancers as those of the prostate, head and neck, pancreas, ovary, and central nervous system. Forty-one percent had seen no patients with malignant melanoma. Conversely, the survey data suggest that lymphomas and leukemias, diseases traditionally managed primarily by departments of medicine and pediatrics, received a disproportionately larger amount of teaching time, and students received more exposure to these

TABLE 2

Percentage Distribution of 1,757 Responding Clinical Students (1978) According to the Number of Specific Cancer Patients Seen During Previous Medical School Experience and the Incidence of Each Type of Cancer in the United States (1983)

Type of Cancer	Percentage of Students Seeing Patients		New Cases*
	None	Six or More	
Lung	5	41	135,000
Colorectal	8	26	126,000
Breast	9	33	114,900
Prostatic	21	13	75,000
Head and neck	27	13	38,100
Lymphoma	17	14	30,700
Pancreatic	31	4	25,000
Leukemia	14	25	23,900
Ovarian	29	8	18,200
Malignant melanoma	41	3	17,400
Central nervous system malignancies	28	10	12,600

* Estimated new cases in the United States, 1983 (8).

patients in relation to diseases of high incidence.

These results may reflect the degree to which patients with certain low-incidence diseases, such as leukemia, are hospitalized, while patients with higher-incidence malignancies, such as colorectal or breast carcinoma, are more likely to be diagnosed and managed primarily as outpatients unless they have major complications. From the survey results, the difficulties in involving students in cancer outpatient management were apparent. These difficulties are usually associated with time and financial pressures arising from large numbers of patients relative to numbers of faculty physicians, with patient acceptance of student involvement, and with scheduling difficulties. Few schools among the 44 visited had developed satisfactory methods for exposing students to cancer outpatients. Seventy-two percent of all student respondents, when asked their opinions about certain possible changes in their curriculum, stated they agreed with the statement that "students should be required to follow at least one cancer outpatient for several visits."

Concerning other curriculum changes, fourth-year students indicated they felt more time should be devoted to multidisciplinary patient management (50 percent), psychosocial issues (49 percent), diagnostic procedures (44 percent), radiation therapy (34 percent), and chemotherapy (32 percent). Percentages for preclinical students were similar, although slightly higher for diagnostic procedures (48 percent) and slightly lower for therapy (26 percent). Over one-fourth of the student respondents had had no personal patient experience involving radiation therapy. Eighty-four percent of the fourth-year students felt that a cancer curriculum should be required for all medical students.

Cancer Education Objectives

As a logical extension of the Cancer Education Survey, with its data on the strengths and deficiencies of cancer education activities in professional schools, a second contract was awarded to the AACE in 1980 by the National Cancer Institute. Again one of the authors (RFB) served as principal investigator, and the other served as chairman of the Medical Oncology Education Committee, which developed a set of cancer education objectives for departments of medicine.

The overall purpose of this project, Evaluation of the Effectiveness of Cancer Education, was to develop a methodology for providing systematic evaluation of the effectiveness of NCI Clinical Cancer Education Program grants. Since effective evaluation presupposes the availability of defined objectives, this project involved the development of a set of cancer education objectives for each major department in medical and dental schools by working committees of the AACE.

The project was completed in 1981, and the objectives were published in that year (2). They provide a definition of the aims of an optimal cancer education program for professional schools. Since clinical teaching is customarily planned, conducted, and evaluated by departments, the objectives were arranged according to academic clinical departments. The basic science objectives were grouped together because of the variability in cancer teaching and research interests among basic science departments. It was recognized that the listing of objectives by department might work against the concept of the importance of interdisciplinary and interdepartmental teaching in cancer education. In order to take that crucial step, the relating of departmentally oriented objectives to interdepartmental coordination of teaching, an approach which

adapts the objectives to the multidisciplinary teaching of cancer medicine was developed by the authors.

Departmental Responsibilities

As an arbitrarily chosen example, lung cancer is used here by the authors to illustrate departmental responsibilities for teaching medical students. A given educational objective is assigned to those departments which might reasonably be expected to have responsibility for that teaching objective. Eight departments are considered: basic science departments (collectively), pathology, medicine, surgery, radiation therapy, diagnostic radiology, psychiatry, and preventive medicine. For each educational objective (for example, etiology, diagnosis, surgery, and irradiation), one department is assigned primary teaching responsibility and others secondary responsibility. The exact assignments, which may vary depending on circumstances, such as the distribution of faculty resources in a given medical school, are less important than the concept that teaching responsibilities should be identified clearly as the first step in developing interdepartmental coordination.

Faculty members in the department of preventive medicine are assigned primary responsibility, for example, for teaching students an educational objective concerning the epidemiology and etiology of lung cancer. In planning this aspect of the curriculum, the preventive medicine faculty has as collaborators faculty members from the basic sciences and the departments of pathology, medicine, and psychiatry (those departments with secondary responsibility for this objective). In contrast, the department of medicine is assigned the primary role for teaching a diagnostic objective concerning clinical presentations, with supportive teaching being provided by the departments of surgery, radiation therapy, and diagnostic radiology.*

In this multidisciplinary approach, the department with the primary responsibility takes the lead in bringing the other designated departments together to develop the curriculum with respect to a given objective. All the objectives for a given tumor site must then be coordinated, either by the department of medicine or by an interdisciplinary cancer education committee. Similar examples denoting areas of teaching responsibility should be constructed for each objective after interdepartmental discussions. The details may be modified, as appropriate, to suit the circumstances of a given school or of a particular teaching philosophy. Designating specific departments to assume primary and secondary roles is less important than it is to define teaching responsibilities in relation to specific educational objectives in the development of a given curriculum. A matrix presentation showing assignment of teaching objectives to departments seems an effective, graphic way of implementing the approach described here concerning the education of medical students in oncology. This approach can address the criticism brought out in the Cancer Education Survey that there is too little interdepartmental coordination of teaching. It can be adapted to accommodate the views of a given medical school, and it also can be applied to non-oncological teaching. For example, the teaching of cardiovascular disease might be coordinated through a similar mechanism, involving designated responsibilities for basic sciences (anatomy, physiology, nutrition), pathology, medicine, surgery, diagnostic radiology, and preventive medicine.

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* A representative list of objectives and suggested assignments may be obtained from the authors.

Discussion

The results of the survey of cancer education in U.S. medical schools indicate a variety of strengths which departments of medicine contribute to interdepartmental cancer education programs for medical students. Faculty members from a variety of medical subspecialties were considered to be cancer education teachers. Faculty members from departments of medicine had assumed educational leadership roles in over half of the medical schools in the subgroup where a cancer education coordinator was identified by departmental affiliation. This degree of major faculty involvement suggests the possibility of departments of medicine making key contributions to the correction of some of the deficiencies revealed by the survey data.

The degree of primary involvement of departments of medicine with such common malignancies as lung and breast cancer, as well as gastrointestinal and hematologic malignancies and management of advanced cancer in general, indicates that deficiencies may result if less than optimal emphasis is given to cancer teaching in departments of medicine during the clerkships. The data in Table 2 suggest that departments of medicine may overemphasize leukemia and lymphoma as examples of neoplasia to the exclusion of teaching activities involving more common malignancies; approximately the same percentage of students during medical school are exposed to leukemia, a relatively uncommon malignancy, as to colorectal and breast carcinomas, two of the more common tumors. The need to involve students in outpatient oncology experiences should be inferred from that observation. Such experiences are important in at least two contexts. First, there is a need for virtually all physicians to be familiar with fundamentals of preventive oncology, including risk factors, early symptoms and signs of common cancers, and indications for appropriate diagnostic procedures. Education in this area would be facilitated by multidepartmental programs of outpatient exposure to patients with localized, early cancer of the colon, rectum, breast, prostate, head and neck, uterus, ovary, and melanoma. Second, outpatient oncology activities would allow students to see more long-term survivors of cancer. Medical oncology, radiation oncology, and surgery follow-up clinics could well provide such longitudinal experiences, during which students would learn about multidisciplinary patient management, nutritional support, pain control, psychosocial support, and rehabilitation. Appropriate interdepartmental coordination would permit the utilization of a variety of departmental outpatient clinics as well as cancer screening facilities.

Medicine clerkships are appropriate sites for teaching medical students the cancer-related procedures of proctosigmoidoscopy and bone marrow aspiration/biopsy, which about half of the fourth-year student respondents stated they had not performed. A systematic program assuring that every medical student would achieve a rudimentary level of skill in these and other important diagnostic procedures, such as indirect laryngoscopy, should be incorporated into either medicine and surgery clerkships or outpatient experiences to assure appropriate competence among all residents.

Obviously medical schools and their departments of medicine are responsible for instruction in many diseases other than cancer. The matrix approach described here, relating departmental responsibilities to educational objectives, could be adapted to a variety of teaching programs. The degree to which the idealized list of cancer education objectives (2) can be approached will depend on the

availability of faculty members who feel comfortable teaching about common neoplastic diseases and on the availability of patients with common malignancies. However, with appropriate interdisciplinary curricular planning and cooperation, all medical schools should be able to provide an adequate basal experience in cancer education for all students. A cancer education committee consisting of representatives from all basic science and clinical departments involved in cancer-related activities as well as nursing and student representatives might well be the key to interdepartmental coordination. Regular meetings of such a committee, with recommendations transmitted to the dean, curriculum committee of the school, and individual department chairmen and members, should facilitate improved utilization of available faculty members and patients in an effective approach toward the educational objectives. Departments of medicine should participate enthusiastically in this coordinating function and provide appropriate leadership and initiative.

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DATAGRAM

Net Patient Revenue at University-Owned Teaching Hospitals, 1981

The Department of Teaching Hospitals of the Association of American Medical Colleges (AAMC) has conducted its 12th annual survey of financial and general operating data for the university-owned members of the AAMC's Council of Teaching Hospitals (COTH). Sixty-five hospitals were asked in April 1982 for information on their fiscal year 1981 operations. By November 1982, all but one had submitted completed questionnaires, yielding a 98 percent response rate. The fiscal 1981 questionnaire was keyed generally to references in the Medicare Cost Report Form HCFA-2552. All questions that appeared in the previous year's survey were again asked. The operating income data are reported on an accrual basis.

State Appropriations

Approximately two-thirds of all of the survey respondents reported receiving some state appropriations in fiscal 1981. In many cases, the state appropriations functioned as a third-party payer and provided the necessary funds, at least in part, to support the provision of services to partial pay or indigent patients who would otherwise be unable to afford such services on their own. State funds apparently were also utilized to subsidize clinical teaching and other educational activities at a number of the responding hospitals. However, while these were labeled as teaching support funds, it is not possible to distinguish in the strictest sense between the patient care and educational uses of these appropriations. The problem of making the distinction is compounded by the fact that some hospitals contracting with the state provided specific types of services to certain groups of patients (for example, those receiving radiation therapy or psychiatric care) and did not always refer to funding for such services as state appropriations.

Table 1 tracks the percentage of the hospitals that received state appropriations by the proportion of their total operating revenues from such appropriations between fiscal 1975 and fiscal 1981. A total of 43 (or 67 percent) of the 64 responding hospitals indicated receipt of some state appropriations in fiscal 1981. Forty of the 43 institutions with state funds were publicly owned hospitals. In each year between fiscal 1975 and fiscal 1981, more than three-fourths of the hospitals reporting state appropriations indicated that these funds accounted for 30 percent or less of their total operating revenue. At only four of the 43 state-funded hospitals did such appropriations account for more than 30 percent in fiscal 1981. And, at only seven of the 43 hospitals did state funds provide the leading source of operating revenue.

For purposes of comparing the dollar amounts of state appropriations made in fiscal 1980 and fiscal 1981, state funds at one hospital were excluded from the data to avoid bias. This hospital was in its first year of operation in fiscal 1981 and relied extensively on state funding. The remaining 42 hospitals received $555 million in state funds in fiscal 1981 compared with $504 million in fiscal 1980. Therefore, the average increase in state appropriations across these 42 institutions was approximately $1.2 million per hospital between the two fiscal years. In absolute dollar amounts, individual state appropriations in fiscal 1981 ranged from a low of $302,159 to a high of $62.5 million.

Net Patient Revenue by Source

In the fiscal 1980 survey, participants were asked specifically to provide information on their net patient revenue by source. Net patient revenue is equivalent to gross patient revenue (based on full established rates) minus contractual adjustments, bad debts, and charity and other deductions. It was felt that the ability to differentiate net payments from gross charges by source would greatly enhance the meaningfulness of the data for comparative purposes. Thirty-nine (61 percent) of the fiscal

TABLE 1

Distribution of University-Owned Teaching Hospitals That Received State Appropriations by Proportion of Their Operating Revenue from Such Appropriations, 1975 Through 1981

Fiscal Year	Percentage Total Operating Revenue from State Appropriations					
	1–10 Percent	11–20 Percent	21–30 Percent	31–40 Percent	41–50 Percent	51–100 Percent
1981 ($n = 43$)	13	15	11	1	2	1
1980 ($n = 44$)	16	12	8	4	4	0
1979 ($n = 43$)	16	9	11	2	4	1
1978 ($n = 41$)	12	13	11	2	3	0
1977 ($n = 41$)	15	10	7	6	2	1
1976 ($n = 40$)	15	9	7	6	3	0
1975 ($n = 38$)	8	11	9	4	5	1

TABLE 2

Sources of Net Patient Revenue for University-Owned Teaching Hospitals That Received State Appropriations Earmarked for Patient Care, Fiscal 1980 and 1981
(In thousands of dollars)

Revenue Source	Fiscal 1981* ($n = 18$)		Fiscal 1980* ($n = 18$)	
	Amount	Percent	Amount	Percent
State appropriations†	228,266	17.7	203,347	18.2
Blue Cross	177,602	13.8	149,249	13.3
Commercial insurance	197,609	15.3	197,449	17.6
Self-pay	75,565	5.9	83,125	7.4
Medicare	325,039	25.2	261,596	23.4
Medicaid	189,836	14.7	145,884	13.0
County appropriations	15,919	1.2	15,657	1.4
City appropriations	0	0	0	0
Additional welfare payments	26,169	2.0	24,878	2.2
Workman's compensation	5,364	0.4	3,858	0.3
Other	46,680	3.6	34,436	3.1
Total	1,288,049	100.0	1,119,480	100.0

* Percentage and dollar amounts may not total due to rounding.

† May include funds for nonpatient care uses.

1981 survey respondents were able to report net patient revenue by source. However, only 29 of these same institutions reported in this way in fiscal year 1980. Therefore, for comparison purposes, tables 2–4 are based on the net patient revenue data from these 29 hospitals or some subset of them, depending on the particular variables being examined.

State appropriations were received by 18 of the 29 hospitals in both fiscal 1980 and fiscal 1981. Table 2 presents net patient revenue data at these 18 hospitals by source for these years. In both years, state appropriations were the second leading source of net patient revenue behind Medicare payments. Medicare revenue, as a percentage of aggregate total net patient revenue, continued to rise in fiscal 1981 (as it had over the past several survey years), while the portion from state appropriations dropped slightly (by 0.5 percentage point). Commercial insurance was the third leading source of net patient revenue among the hospitals that received state appropriations in each fiscal year, but dropped considerably (by 2.3 percentage points) in its portion of aggregate total net patient revenue between fiscal 1980 and fiscal 1981. Medicaid was next highest in fiscal 1981 at 14.7 percent, a 1.7 percentage point increase over the fiscal 1980 figure. The average total net patient revenue

TABLE 3

Sources of Net Patient Revenue for University-Owned Teaching Hospitals That Did Not Receive State Appropriations Earmarked for Patient Care, Fiscal 1980 and 1981

(In thousands of dollars)

Revenue Source	Fiscal 1981* ($n = 9$)		Fiscal 1980* ($n = 9$)	
	Amount	Percent	Amount	Percent
Blue Cross	180,442	26.5	162,891	27.4
Commercial insurance	121,079	17.8	115,447	19.4
Self-pay	55,888	8.2	37,035	7.9
Medicare	199,135	29.3	176,853	29.7
Medicaid	46,289	6.8	37,212	6.3
County appropriations	587	0.1	510	0.1
City appropriations	0	0	0	0
Additional welfare payments	5,692	0.8	6,778	1.1
Workman's compensation	1,672	0.2	1,759	0.3
Other	69,564	10.2	46,466	7.8
Total	680,349	100.0	594,951	100.0

* Percentages and dollar amounts may not total due to rounding.

TABLE 4

Sources of Net Patient Revenue by Type of Care in University-Owned Teaching Hospitals, Fiscal 1980 and 1981*

(In thousands of dollars)

Revenue Source	Fiscal 1981 ($n = 28$)†				Fiscal 1980 ($n = 28$)†			
	Outpatient		Inpatient		Outpatient		Inpatient	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Blue Cross	38,520	15.2	356,155	20.4	29,713	13.5	313,662	21.0
Commercial insurance	38,102	15.0	295,048	16.9	32,580	14.8	294,361	19.7
Self-pay	44,583	17.6	96,376	5.5	48,758	22.1	98,135	6.6
Medicare	50,152	19.7	506,307	29.0	39,440	17.9	430,023	28.7
Medicaid	33,556	13.2	235,322	13.5	30,054	13.6	180,563	12.1
State appropriations‡	22,922	9.0	109,530	6.3	19,619	8.9	68,047	4.5
County appropriations	4,696	1.9	11,810	0.7	4,315	2.0	11,852	0.8
City appropriations	0	0	0	0	0	0	0	0
Additional welfare payments	4,216	1.7	27,645	1.6	4,528	2.1	27,029	1.8
Workman's compensation	893	0.4	6,119	0.4	804	0.4	4,780	0.3
Other	16,368	6.4	97,375	5.6	10,459	4.7	68,169	4.6
Total	254,008	100.0	1,741,687	100.0	220,270	100.0	1,496,621	100.0

* Data reported only for those hospitals able to separate net patient revenue into inpatient and outpatient categories.

† Percentages and dollar amounts may not total due to rounding.

‡ Includes only funds reported as net patient revenue.

at the 18 state-funded hospitals grew from $62.2 million in fiscal 1980 to $71.6 million in fiscal 1981, a 15.0 percent increase.

As shown in Table 3, nine of the hospitals able to report net patient revenue by source in both fiscal 1980 and fiscal 1981 indicated receipt of no state appropriations in either year. Among these institutions, Medicare, Blue

Cross, and commercial insurance were the three leading sources of net patient revenue in descending order in each year, accounting for approximately three-fourths of total net patient revenue in the aggregate. Medicaid in fiscal 1981 contributed only 6.8 percent of total net patient revenue, or about half its percentage contribution to the hospitals that received state funds. The average total net patient revenue at the nine non-state-funded hospitals rose from $66.1 million in fiscal 1980 to $75.6 million in fiscal 1981, a 14.4 percent increase.

Net Patient Revenue by Type of Care

Twenty-eight of the hospitals able to report net patient revenue by source in both fiscal 1980 and fiscal 1981 were able to separate this revenue into inpatient and outpatient categories in each fiscal year. Table 4 lists these data. On the inpatient side, Medicare was the leading source of net patient revenue in each year, followed by Blue Cross and commercial insurance (which fell 2.8 percentage points in its portion of aggregate total net inpatient revenue at the 28 hospitals between the two years). Although the proportion of net inpatient revenues from state appropriations increased between fiscal 1980 and fiscal 1981, it still accounted for only 6.3 percent of the aggregate total net inpatient revenues for the 28 hospitals in fiscal 1981. The average total net inpatient revenue per hospital rose from $53.5 million in fiscal 1980 to $62.2 million in fiscal 1981, a 16.3 percent increase.

On the outpatient side, the leading sources of net patient revenue differed between the two years among the 28 hospitals able to report such revenue by type of care. In fiscal 1980, self-pay patients were the leading source of net outpatient revenue, followed by Medicare and commercial insurance. In fiscal 1981, Medicare became the leading source of net outpatient revenue for these hospitals, followed by self-pay patients and Blue Cross (which was closely followed by commercial insurance). It is difficult to ascertain the meaningfulness of this year-to-year variation due to the tendency of several respondents to report combined totals for revenue from Blue Cross, commercial insurance, and/or self-pay patients rather than separately identifying amounts for each source. On average, the total net outpatient revenue at the 28 hospitals increased from $7.9 million in fiscal 1980 to $9.1 million in fiscal 1981, a 15.2 percent increase.

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